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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,364	12/20/2001	Francis J. Kub	N.C. 79,684	3513

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EXAMINER

FOONG, SUK SAN

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 11/21/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/022,364

Applicant(s)

KUB ET AL.

Examiner

Suk-San Foong

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-9 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claim 1 recites the limitation "the growth substrate" in 8. There is insufficient antecedent basis for this limitation in the claim.
4. Claim 15, line 2, it appears that the term "comprising" should be replaced by--comprises--.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 7 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Henley et al. ('567).

Henley et al. ('567) teaches a method of forming thin film material on a device which includes providing silicon wafer 2100 (Col. 12, lines 20-22 and Col. 16, lines 34-39), then forming thin film 2101 on silicon wafer 2100 (Col. 12, lines 22-25, Col. 3, lines 56-60, and Fig. 12), then optionally forming stiffening layer 2102 on surface of silicon wafer 2100 (Col. 12, lines 28-30), subsequently implanting hydrogen at selected depth ( $z_0$ ) into silicon wafer 2100 thereby forming hydrogen ion layer 2111 (Col. 4, lines 53-55, and Col. 12, lines 34-38 and 56-65), then optionally applying an adhesive layer between bonding surfaces of silicon wafer 2100 and flexible substrate 2201 (Col. 13, lines 32-34), subsequently bonding silicon wafer 2100 to flexible substrate 2201 such as plastic (Col. 12, line 66 to Col. 13, line 6, and Fig. 13), subsequently splitting silicon wafer 2100 along hydrogen ion layer 2111 by using liquid or gas jet directed at the side of silicon wafer 2100 (Col. 14, line 64 to Col. 15, line 9), and then smoothing surface 2601 of the resulting silicon wafer 2100 (Col. 15, line 66 to Col. 16, line 10, and Fig. 17).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 5, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. ('567) as applied to claims 1-4, 7 and 9 above, and further in view of Kub et al. ('108).

Henley et al. does not teach directing nitrogen gas steam or liquid stream at the side of the substrate.

Henley et al. does not teach implanting boron.

Kub et al.'s prior art teaches a method of implanting both hydrogen and boron ions into a substrate and then splitting the substrate along a hydrogen implanted ion layer using high-pressure nitrogen gas where the boron implant lowers the thermal energy required for splitting the substrate (Col. 2, lines 1-25).

It would have been within the scope to one ordinary skill in the art to combine both teachings because it would enable the step of splitting silicon wafer 2100 of Henley et al. to be performed.

In regard to claim 8, the recited etch stop layer would be obtained as the same materials are being treated the same as the instant invention (see instant page 6, line 3).

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10. Claims 10-16, 18-19 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. ('567) as applied to claims 1-4, 7 and 9 above, and further in view of Lutzen et al. ('169), Kub et al. ('108) and Lee et al. ('6,312,567).

Henley et al. does not disclose the steps are recited in claim 10, lines 2-8.

Lutzen et al. discloses a method of forming a semiconductor device which includes providing substrate W1 (Paragraph [0041], and Fig. 1A), then forming oxide layer 2A consisting of material such as semiconductor layer, electrically conductive layer and dielectrics such as metal oxides on substrate W1 (Paragraph [0041] and [0045]), then forming adhesion and barrier layer 2B consisting of more than one conductive layer including titanium, platinum and iridium (Paragraphs [0041], [0008], [0045]), subsequently forming another thin film layer 2A consisting of material such as semiconductor layer, electrically conductive layer and dielectrics such as metal oxides (Paragraph [0041] and [0045]), subsequently bonding substrate W2 with hydrogen ion implant to substrate W1 (Paragraph [0042], and Fig. 1B), and then splitting substrate W2 (Paragraph [0044], and Fig. 1C).

It would have been within the scope to one ordinary skill in the art to combine both teachings because it would enable formation protective layer 2A and 2B of Lutzen et al in the process of Henley et al. and enable further advantage of preventing incompatible materials from diffusing out via the necessary connecting paths thus making it possible to prevent negative mutual influences between the elements in the various element layers during production process or in operation (Paragraph [0029]).

It would have been within the scope to one ordinary skill in the art to combine both teachings because it would enable formation of thin film 2101 of Henley et al. to be performed.

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In regard to claim 14, Henley et al. does not teach directing nitrogen gas steam or liquid stream at the side of the substrate.

Kub et al.'s prior art teaches a method of splitting a substrate along a hydrogen implanted ion layer using high-pressure nitrogen gas (Col. 2, lines 1-4).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Kub et al.'s prior art with the combination because it would enable the step of splitting silicon wafer 2100 of Henley et al. to be performed.

With respect to claim 17, the combination process does not disclose that the protective layer is comprised of MgO.

Lee et al. discloses the use of MgO as a dielectric material for use in semiconductor fabrication process and as an alternative to silicon dioxide for use in semiconductor fabrication process (Col. 4, lines 49-51).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Lee et al. with the combination process because it would enable formation of the dielectric layer 2A of Henley to be performed.

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. ('567) as applied to claims 1-4, 7 and 9 above and further in view of Lutzen et al. ('169), Kub et al. ('108) and Lee et al. ('6,312,567) as applied to claims 10-16, 18-19 and 21-25 above, and further in view of Srikrishnan ('987).

The combination process does not teach the step as recited in claim 20.

Srikrishnan teaches a method of forming a thin film on a semiconductor device which includes providing a single crystalline semiconductor substrate 500 (Col. 4, lines 22-23, and Fig. 5A), then forming etch stop layer 505 comprised of material such as Si-Ge or Ge (Col. 4, lines 28-38), subsequently forming thin device layer 510 over substrate 500 (Col. 4, lines 43-45), subsequently forming stiffening layer 515 (Col. 4, lines 56-57, and Fig. 5B), then implanting hydrogen ions into substrate 500 thereby forming hydrogen ion layer 502 (Col. 5, lines 4-10, and Fig. 5B), subsequently bonding substrate 500 with substrate 530 (Col. 5, lines 25-26, and Fig. 5C), then splitting substrate 500 at the hydrogen ion layer 502 (Col. 5, lines 33-36, and Fig. 5D), then annealing device layer 510' in order to promote a stronger bonding between substrate 530 and device layer 510' (Col. 5, lines 46-50).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Srikrishnan with the combination because it would enable the step of annealing thin film 2101 of the combination to be performed and obtain further advantage of promoting a stronger bonding between substrate 530 and device layer 510' (Srikrishnan, Col. 5, lines 46-50).

### *Conclusion*

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.




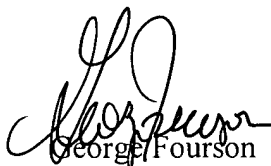
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
November 17, 2002

  
George Fourson  
Primary Examiner  
Art Unit 2823